

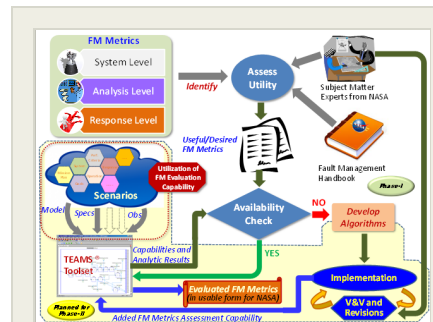
Fault Management Technologies - Metrics Evaluation and V&V, Phase I

Completed Technology Project (2015 - 2015)



Project Introduction

Functional robustness, resulting from superior engineering design, along with appropriate and timely mitigating actions, is a key enabler for satisfying complex mission goals, and for enhancing mission success probability. Fault Management (FM) is a crucial mechanism to ensure system functionality from system design through the operational phase of a mission. FM is implemented with spacecraft hardware, on-board autonomous software that controls hardware, software and information redundancy, ground-based software and procedures. A major issue in the development and operation of Fault Management (FM) is the determination of the value of the various components of FM design within a system. Without comprehensive measures of value, FM designers and system engineers are left with qualitative arguments often tied to fault tolerance requirements (for example, single fault tolerance, fail-operational-fail safe) or one-off, ad hoc analyses to estimate the risks associated with particular failures and design measures to mitigate them. Qualtech Systems, Inc., in collaboration with Dr. Stephen B. Johnson of University of Colorado at Colorado Springs (UCCS) and President of Dependable System Technologies, LLC, proposes to develop techniques and concomitant software tools for evaluating FM metrics by using TEAMS® as the underlying platform. This proposal aims to utilize recent advances in the theory and practice of FM, and in particular in the theory and practice of FM metrics, to enhance the ability of system and FM engineers and operators to measure and document the value, cost and risks associated with the FM design. In turn, this provides the information needed to compare alternative FM designs, quantitatively evaluate how well a system is achieving its goals, and enables more effective verification and validation (V&V) of selected FM design.



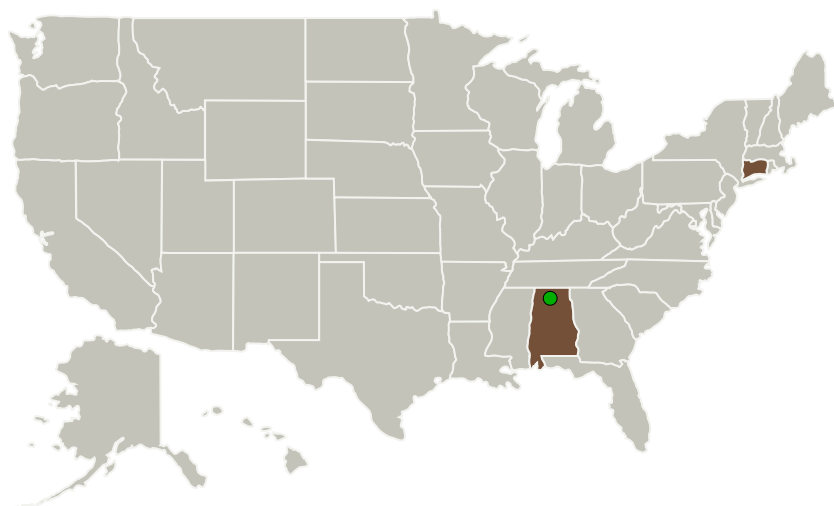
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Qualtech Systems, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Rocky Hill, Connecticut
● Marshall Space Flight Center (MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations

Alabama	Connecticut
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Project Transitions



June 2015: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Qualtech Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

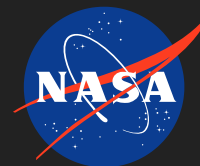
Sudipto Ghoshal

Co-Investigator:

Sudipto Ghoshal

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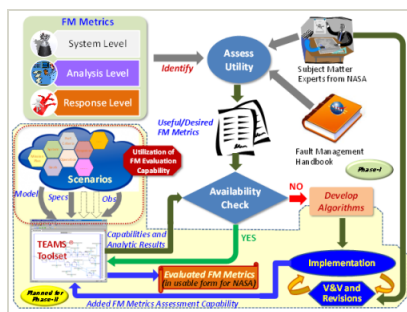
✓ **December 2015:** Closed out

Closeout Summary: Fault Management Technologies - Metrics Evaluation and V&V, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/138863>)

Images



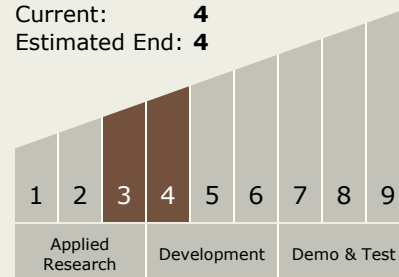
Briefing Chart Image

Fault Management Technologies - Metrics Evaluation and V&V, Phase I

(<https://techport.nasa.gov/image/131241>)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
 - TX13.2 Test and Qualification
 - TX13.2.6 Advanced Life-Cycle Testing Techniques

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System